

The atmospheric conditions on the 5th were quite critical for a large portion of the Lake district, the oscillations of pressure being remarkably great. At Chicago a fall of about .20 inch occurred between 11 a. m. and 12 noon, and then again about .11 inch from 1:30 to 2:15 p. m. Severe squalls resulted in this vicinity and in the surrounding country. Several seiches occurred on southern Lake Michigan, the water rising and falling a number of times during the day. The lowest point reached at Chicago was 2.5 feet below normal and the highest 2.5 above, a fluctuation of 5 feet.

Except two warm periods, 3d to 5th, and 21st to 23d, the month was unusually cool throughout the district.

Heavy rainfalls occurred quite frequently during the month, the most marked periods being in the Missouri Valley, Kansas, and upper Mississippi Valley on the 1st; the upper Mississippi Valley and Lake region on the 3d; Illinois and the Ohio Valley on the 5th, and the Missouri and central Mississippi valleys on the 24th. The most pronounced heavy rains for a number of years began on the eastern Rocky Mountain slope on the 25th, and extended from that section eastward to the Atlantic coast during the 26th, 27th, and 28th. A number of stations in eastern Nebraska, northern Missouri and southwestern Iowa reported from 5 to 7.5 inches of rainfall in twenty-four hours.—*F. J. Walz, Inspector.*

#### DENVER FORECAST DISTRICT.

The month was not marked by unusual conditions.—*F. H. Brandenburg, District Forecaster.*

#### SAN FRANCISCO FORECAST DISTRICT.

On the 18th local storms occurred in southern California, and in places in San Bernardino County trees were uprooted by the wind. Some buildings were struck by lightning, but the damage was not great.—*A. G. McAdie, Professor of Meteorology.*

#### PORTLAND, OREG., FORECAST DISTRICT.

No storms or frost occurred and no warnings were issued.—*E. A. Beals, District Forecaster.*

#### AREAS OF HIGH AND LOW PRESSURE.

*Movements of centers of areas of high and low pressure.*

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
<b>High areas.</b>										
I.....	4, a. m.	47	123	8, p. m.	41	72	3,025	4.5	672	28.0
II.....	8, a. m.	45	123	16, p. m.	46	60	4,725	8.5	556	23.2
III.....	16, p. m.	47	88	19, p. m.	46	60	1,925	3.0	642	26.8
IV.....	17, a. m.	53	122	21, p. m.	35	75	3,000	4.5	667	27.8
V.....	25, p. m.	53	108	29, p. m.	46	60	2,475	4.0	619	25.8
VI.....	27, a. m.	54	114	4, a. m.*	41	72	3,125	8.0	391	16.3
Sums.....							18,275	32.5	3,547	147.9
Mean of 6 paths.....							3,046		591	24.6
Mean of 32.5 days.....									562	23.4
<b>Low areas.</b>										
I.....	1, a. m.	37	120	8, a. m.	46	60	4,000	7.0	571	23.8
II.....	6, p. m.	39	108	8, p. m.	35	94	900	2.0	450	18.8
III.....	7, p. m.	50	97	10, p. m.	46	60	1,975	3.0	658	27.4
IV.....	8, p. m.	48	104	12, p. m.	48	68	2,225	4.0	556	23.2
V.....	17, a. m.	51	104	19, a. m.	48	68	1,625	2.0	812	33.8
VI.....	17, p. m.	37	120	22, p. m.	48	68	3,200	5.0	640	26.7
VII.....	24, p. m.	41	117	29, a. m.	37	75	2,900	4.5	644	26.9
Sums.....							16,825	27.5	4,331	180.6
Mean of 7 paths.....							2,403		619	25.8
Mean of 27.5 days.....									611	25.5

\*September.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*George E. Hunt, Chief Clerk, Forecast Division.*

#### RIVERS AND FLOODS.

Frequent and copious rains over the Missouri and upper Mississippi watersheds during the month prevented the usual seasonal decline in the rivers of those districts, and their mean stages were somewhat higher than during the preceding month, as well as considerably above the normal August stages.

The lower Mississippi fell almost steadily throughout the month, but no low water was experienced in any locality. The stages of the Ohio River and its tributaries were fairly satisfactory for all purposes except those of the upper Tennessee River, where low water necessitated a suspension of navigation for about one-half of the month.

On the 28th and 29th there were heavy rains over the upper Susquehanna watershed, and the river began to rise rapidly on the 29th. At Wilkesbarre, Pa., the river rose 14.6 feet from the 28th to the 30th, inclusive, with a maximum stage of 20 feet, or 3 feet above the danger line. Warnings of the coming rise were issued on the previous day, the water then standing at 7.3 feet.

Heavy rains fell over Texas during the last week of July, the amounts over the middle drainage basins of the Colorado and Brazos rivers ranging from 3 to 9 inches. The result was a marked rise in the rivers, necessitating the issue of flood warnings, beginning on July 29. The following report on these floods was prepared by Mr. L. H. Murdoch, Section Director, in charge of the United States Weather Bureau office at Galveston, Tex.:

Heavy rains began to fall over Texas on July 25, and by the 29th and 30th the middle drainage basins of the Colorado and Brazos rivers had received between 3 and 9 inches of precipitation. On the 29th the following warning was telegraphed to interested places on the Colorado River:

"Heavy floods will occur in streams emptying into the Colorado River near Austin, causing a marked rise in the Colorado River at Austin by Friday (in two days)."

On July 30 the following was telegraphed to interested localities along the Brazos River:

"Heavy floods will occur in streams emptying into the Brazos River between Waco and Hempstead, causing a decided rise in the Brazos River within the next few days."

The rise in the Colorado River at Austin was less than expected and unimportant, but a few miles below that place the river rose rapidly and left its banks. On the 30th a special observation telegraphed from Columbus showed a stage of 28.2 feet, or 4.2 feet above the danger line. The following warning was immediately telegraphed to towns below Columbus:

"Colorado River 4 feet above the danger line at Columbus. Crest of flood will reach Wharton by Sunday (in three days) and Bay City by Tuesday (in five days). Flood stages will continue several days."

The river continued to rise at Columbus until August 1, when a reading of 34.9 feet was recorded. Columbus is the lowest station on the Colorado River, and no record of levels below that point was received.

The rise in the Brazos River at Waco was only a few feet, but many of the streams flowing into it between Waco and Hempstead overflowed the adjacent bottoms. In a few localities the Brazos River itself left its banks, but not generally. The river rose quite rapidly at Hempstead, and the regular observation on August 3 gave a stage of 31.5 feet with rising water. On August 3 the following warning was telegraphed to points below Hempstead:

"Brazos River 32 feet at Hempstead and rising slowly. Flood stages of about 35 feet are now indicated for points below Hempstead. Crest of flood will reach Richmond and Booth about Thursday (August 6)."

The crest of the flood reached Booth on August 4, but practically the same level continued on the morning of the 5th. The highest stage recorded at Booth was 25.3 feet.

While not verified in some details, the warnings were timely and of great value to people having property interests in the river bottoms. The warnings issued for the Brazos River and the streams emptying therein were very favorably commented upon by the press.

A special case, in which the warnings proved of great value, is that of the Brazoria Irrigation Company, with headquarters in Galveston. One of the lifts of this company, located near Richmond, burned down a few days before the high water, and the brick wall next to the river collapsed. The coming flood would cause damage to the amount of several thousand dollars if the wall was not immediately repaired. When the flood warnings were issued the irrigation company chartered a special train, carrying mechanics and material to their plant. The workmen were able to keep the wall above the rising water and no damage resulted.

The highest and lowest water, mean stage, and monthly

range at 174 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mis-

issippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, District Forecaster.*

## CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions during August are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

**Alabama.**—Weather during first two decades generally favorable for growth and maturing of crops, except locally excessive and slightly damaging rains in middle and southern counties toward close of second decade; excessively hot weather during early part of last decade caused cotton to wilt and shed badly, and late corn and some minor crops to deteriorate rapidly; last day of month quite cool; rainfall generally deficient in northern and eastern counties.—*F. P. Chaffee.*

**Arizona.**—The weather was generally very warm, except in the western portion of the Territory; showery conditions prevailed during the greater part of the month, precipitation being above normal in the eastern portion. The supply of irrigation water was generally sufficient for the crops, which all did well and made good progress toward maturity. The ranges were in fine condition and afforded excellent grazing for stock.—*M. E. Blystone.*

**Arkansas.**—The temperature was about normal, with an excess of precipitation. Cotton made fair progress; it continued fruiting and blooming, but there was some complaint of shedding, rust, and blight; bollworms and sharpshooters made their appearance, but were not general; the crop is still late and promises only a fair yield. An average crop of early corn was assured; the late was fairly promising. Considerable hay and fodder of excellent quality were secured. Sweet potatoes were promising. Late apples are scarce and of inferior quality. At the close of the month all late growing crops were in need of rain, especially late corn.—*O. C. Burrows.*

**California.**—The temperature of the month was slightly below normal, but there were a few days of extremely high temperature, causing trifling injury to fruit and beans. Conditions were generally favorable for drying and maturing the heavy crops of deciduous fruits and grapes. The grain crop was practically all harvested by the close of the month and thrashing and hay baling were in progress. Hops and sugar beets were yielding good crops.—*Alexander G. McAdie.*

**Colorado.**—Showers materially aided the supply of irrigation water. Harvest of small grain made rapid progress and thrashing was general by the second decade, except in the higher districts. Corn made favorable growth and cutting had begun before the close of the month. Potatoes, sugar beets, and fruits did well, with indications of a large yield of late fruits and potatoes. Most of the second crop of alfalfa was secured and much native hay was stacked in prime condition; ranges were good and stock thrifty.—*Charles E. Linney.*

**Florida.**—Precipitation was insufficient by reason of unequal distribution. Some local heavy rains damaged cotton and vegetables and delayed haying. The most serious factor during the month was the hot weather during the last week. The hot sun, with intermittent showers, scalded plants and caused squares and leaves to fall. The first half of the month was quite favorable. The last decade was damaging to cotton; picking began during the last decade, becoming brisk during the closing days; the crop will be much below the average. Corn, cane, citrus fruits, pineapples, and minor crops are good.—*A. J. Mitchell.*

**Georgia.**—During the first three weeks well-distributed showers were of almost daily occurrence and crops of all kinds made favorable progress. An excessively warm and dry week followed, during which vegetation suffered seriously, especially cotton. Under the influence of constant sunshine and high temperature cotton shed and rusted considerably. Picking was becoming general at the close of the month, with prospects unfavorable for an average yield.—*J. B. Marbury.*

**Idaho.**—Conditions were generally favorable for irrigated crops, though in some localities canals failed to carry sufficient water. Haying, harvesting, and thrashing progressed rapidly. Fruit made satisfactory advance, and shipping was in progress at the close of the month. Ranges suffered somewhat from drought.—*S. M. Blandford.*

**Illinois.**—Droughty conditions prevailed over a portion of the southern district throughout the month. They were most pronounced in the extreme southern tier of counties, as rainfall in ample quantities occurred over the other portions of the State. Corn was generally in a thrifty condition at the end of the month, although from two to three weeks backward. Oats were harvested and thrashed, mostly under favorable conditions.—*Wm. G. Burns.*

**Indiana.**—Precipitation during the month was ample and fairly well distributed. Excepting in the last decade the temperature, particularly at night, was too low for rapid growth of crops. Thrashing wheat and oats

completed early in the month, yield light. Corn, which was one to three weeks behind, made slow growth and, except in north section, promised less than average crop. Late potatoes promised fair crop; apple crop light, and fruit falling. Canneries started on tomatoes and sweet corn.—*W. T. Blythe.*

**Iowa.**—Month cooler than usual, with double the normal rainfall and deficient sunshine. Prevalent humidity and cloudiness during first and last weeks delayed thrashing and other fieldwork, but fair progress was made between the 10th and 24th. Growth of corn was unusually slow, causing much anxiety for the future safety of the crop, on account of its belated condition. Thrashing returns unsatisfactory, except timothy seed. Good progress in fall plowing. Early apple crop good.—*John R. Sage.*

**Kansas.**—Early corn advanced from roasting ear stage at the first of the month to cutting stage by the end; late corn grew rapidly, advancing through the silking and tasseling to the earing stage, and was well eared before the close of the month. Prairie grass made fine growth and haying was pushed when weather permitted. Cutting of third crop of alfalfa progressing at the end of the month. Fall plowing and thrashing continued. Apples were abundant in the south, and fine ones were being marketed from Shawnee County.—*T. B. Jennings.*

**Kentucky.**—The temperature during most of the month was too low for best results. The rainfall was very unevenly distributed and drought was severe in some localities. Crops made fair progress, however, over the greater portion of the State. Corn and tobacco were very good in central, southern, and most of the western counties, but badly damaged in northeastern counties. Both crops were being cut rapidly. Hemp was short. Plowing retarded by drought. Wheat acreage reduced.—*H. B. Hersey.*

**Louisiana.**—Frequent showers during the first decade were unfavorable for cotton. A rapid growth in the plant resulted, but very little fruit was developed. Less rainfall and more sunshine during the second decade caused some improvement, while the weather of the third decade improved the crop in some localities and injured it in others. Ideal weather for the sugar cane crop prevailed throughout the month and a rapid growth resulted. Rice developed rapidly and is very promising. Corn is doing well. Fall truck gardens are being planted.—*J. M. Cline.*

**Maryland and Delaware.**—The cool, wet, and cloudy weather interfered with farm work and prevented rapid growth or maturity. Corn continued backward, on account of low temperatures and insufficient cultivation. Final harvest of wheat gave light yields, and of oats light to fair returns. Buckwheat grew nicely. Pastures continued good. The late hay harvest was excellent in quality and quantity. Much tobacco was cut and housed; the crop was good, but curing was not satisfactory at all times. Apples were promising. Tomatoes and melons yielded below average. Potatoes were an abundant crop, but the loss by rot was large. Fall plowing made about an average advance.—*Oliver L. Fussig.*

**Michigan.**—Meadows, pastures, sugar beets, and beans on high land made good progress. Wet weather and cool nights caused slow growth of corn and were detrimental to fruit and to beans and potatoes on low lands. Some oats and peas were damaged by heavy rains. At the close of the month apples continued fairly promising, and corn, although backward, was quite thrifty.—*C. F. Schneider.*

**Minnesota.**—Several general rains and much showery and cloudy weather during the month. Low temperatures for the season occurred early in the month, again before the middle of the month, and also during the last week. Oat harvest was general and spring wheat harvest was begun in the southern half about the 1st. The cutting of spring wheat, oats, barley, and flax was finished by the 25th, except the late crops, which were still being cut at the end of the month. Stacking and shock thrashing were carried on as rapidly as possible after harvest, but wet weather caused much delay, and toward the end of the month much shocked grain was suffering injury from dampness. In parts of the south the fields were too wet for the movement of binders and thrashers. Corn was backward all the month.—*T. S. Outram.*

**Mississippi.**—The mean temperature and the average rainfall for the month were slightly above normal. Cotton generally made a good growth and fruited well, although it continued about three weeks late. Rust and shedding were general, but serious only in some of the southern counties. Bolls began to open about the 15th and by the close of the month picking was general in the south. A splendid crop of corn matured nicely. Much hay and fodder were saved in good condition. Minor crops did well. Fall crops were planted and generally came up to good stands.—*W. S. Belden.*

**Missouri.**—In a few eastern and southern counties corn suffered considerably from drought, but elsewhere there was generally sufficient